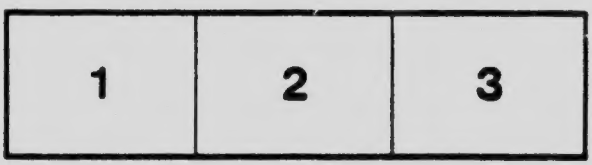

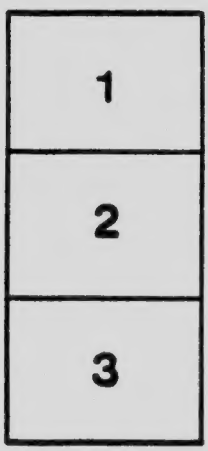

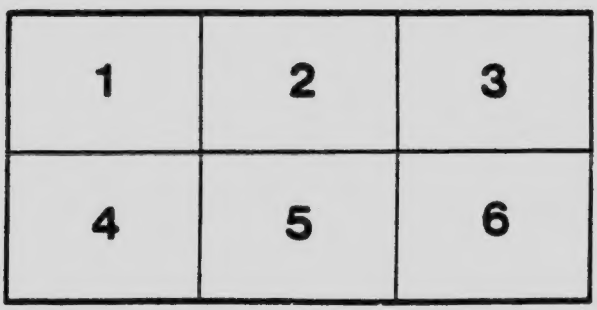

GEOLOGICAL SURVEY OF CANADA
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MINERAL RESOURCES OF CANADA

BULLETIN

ON

PEAT

BY

R. CHALMERS, LL.D.

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PEAT IN CANADA

By R. Chalmers, LL.D.

Definition and origin.

The origin of the name peat is obscure, but it is supposed to be of North German or Anglo-Saxon extraction from a word signifying bog or pond. As employed at present the term includes a number of substances of vegetable production, though in its restricted sense it is generally applied to the mosses of the genera *Sphagnum*, *Hypnum*, etc., when found growing together in a dense mass forming a bog in situations where the drainage is imperfect. These mosses, particularly the *sphagna*, cannot live except in clear, standing water and in a crowded condition. Their peculiar mode of growth, increasing the length of the stems upwards year after year, while dying at the roots, perpetuates their existence and raises the surface of the bogs of which they form part. The *sphagna* hold water like a sponge, and small pools are occasionally seen in the undrained parts of the moors when these are large. The water absorbed by the mosses, of which they contain 85 to 95 per cent by weight, is wholly due to the rainfall, the growth of the *sphagna* depending upon their complete saturation. The part of the bog retaining the moisture all the year round, or that from which there is the least drainage, is usually higher than the margin. Around the periphery where there is more or less seepage, or escape of the contained water, the mosses are checked in their growth and often die, the bogs in such places exhibiting dead peat. This destruction of the life of the mosses is, however, more apparent in the interior of the country where the summers are hotter and the air drier than it is along the coasts. Their healthy condition depends so much on an ample rainfall and cool summers that in dry years considerable quantities are killed, or suffer a serious check in their growth; hence the existence of so much dead peat in some portions of the interior. Drought and a diminished rainfall are inimical to the growth of peat bogs; thus the central and undrained parts of the larger bogs are often higher than the margins, because these are the last to become drained out.

Origin of name.

Mode of growth of the mosses.

Conditions of their existence.

Every peat bog, though composed of a variety of vegetable forms, mosses, herbaceous plants, shrubs and trees, is a unit of itself, a concrete whole, a product of the climate and soil, its life closely related to these, and affected by every change to which they are subject.

GEOLOGY AND PHYSICAL FEATURES OF THE PEAT BOGS.

Age of the peat bogs.

The greater number of the peat bogs in Canada belong to the Recent or Prehistoric period, or to the period intervening between the ice age, so-called, and the present, and are indeed still in process of growth. Peat of interglacial and probably pre glacial times has however, been discovered. At River Inhabitants, Cape Breton, a bed of this material was found under boulder clay.* At the head of Chignecto bay, in Cumberland basin in the bay of Fundy, peat has been met with under recent deposits, one of the beds at Aulac station, Intercolonial railway, twenty feet thick, occurring under eighty feet of marsh mud.† In a number of places around the Strait of Northumberland the peat bogs lie in basins which are at least five to ten feet below the level of high tides. If these basins were emptied of peat they would now be occupied by the sea. As the mosses which principally compose the peat cannot grow in salt water, it is inferred that these basins must have been above the reach of the sea when the peat first began to grow in them, and hence there must have a slight sinking of the land or a rising of the sea since. It is probable that the bogs along the coasts commenced to form as soon as the land emerged from beneath the sea in post-glacial time, while those upon the higher grounds and in the interior are older and have, perhaps been in existence since the close of the glacial period. Evidently they did not all originate at the same time, but at different stages, as the mosses composing them found a suitable habitat, and the climatic conditions, drainage, etc., became favourable to their development. Nearly all the peat mosses in Canada seem to be still growing and increasing in area and depth.

The central parts of nearly all the larger bogs are treeless, or have only a few stunted forms of black spruce and hacmatac upon them. Around the borders there is a thicker growth, when the bog is in its natural state. In some countries attempts have been made to show that the moors, which have thus lost their forest covering, became denuded because of a change in the climate, or in the elevation of the land, or in some other manner since the peat began to grow. But the facts obtained by the writer in the study of these formations for

* Acadian Geology, 2nd Ed. p. 68.
†Annual Report, Geol. Sur. Can. Vol. VII, p. 129 M.

many years do not favour this hypothesis as regards our Canadian peat bogs, and another and more natural explanation has suggested itself. For example, it was found that the bogs occur at all stages of growth and development from the incipient moss only a few inches in thickness to others twenty or thirty feet deep covering thousands of acres. The younger peat mosses have, in their natural state, generally a forest growth upon them composed of much larger trees than are found upon the older bogs. But as the mosses continue to grow and the bog to increase in thickness the trees gradually die, first those in the centre, the area of dead and stunted trees widening as the bog develops. After a time the dead trees fall and disappear from view under the growing moss, the central part of the bog especially becoming treeless first, but the roots and stumps and sometimes portions of the trunks are preserved by the antiseptic properties of the peat moss, and are often found in a sound condition and occasionally with the bark upon them. From these facts it would appear, that the killing of the trees and the deforestation referred to is simply a result of the growth of the mosses which swathe their roots and the base of their trunks in such a manner as to check the circulation and eventually destroy them. And as the bog grows and thickens this treeless area expands. All this may occur without any change of climate, or of the the level of the land, but simply from the natural growth of the *sphagna*. Causes of treeless condition.

Though so many of our peat beds occupy shallow basins, few, if any, seem to have originated in the growth of mosses around or upon the margins of ponds or small lakes as in some countries. Peat *sphagnum* flourishes best in the pure, cold, static waters absorbed by them. The fact that in the bottom of nearly all our peat bogs, roots and stumps of trees and shrubs indigenous to the soil are found, would indicate that they did not begin to grow in or upon bodies of water which had any permanence, but merely in hollows occupied by water occasionally, or at certain seasons of the year

MOSSES AND OTHER PLANTS OCCURRING IN PEAT BOGS.

In Prof. J. Macoun's Catalogue of Canadian Plants, Part VI*, the mosses which occur in peats bogs in Canada are enumerated, showing there are about thirty species all told, with a large number of varieties. Of these about twenty belong to the genus *Sphagnum* and five to *Hypnum*, the remainder being species of *Polytricum*, *Dicranum*, Mosses and other plants constituting the peat bogs.

* Catalogue of Canadian Plants, Geol. Surv. Can., part. VI, Musci.

etc. All but a few of these are comparatively rare, and *Sphagnum acutifolium*, *S. fuscum* [illegible] two varieties, *S. Gingenshonii*, *S. imbricatum*, and two or three others seem to constitute the great bulk of the bogs. Besides the mosses the bogs are often covered, more or less thickly in places etc, with ericaceous plants, stunted black spruce, hackmatac, etc., which appear to have grown in certain parts throughout their whole existence from their incipient stages. These are still found living in spots near the margin as well as upon the drier parts. The species of ericaceous plants most common in the bogs are *Vaccinium macrocarpa*, *V. palustris*, *Gaylussacia dumosa*, *Cassandra calyculata*, *Ledum*, *Latifolium*, *Kalmia*, two species, *Rubus Chamæmorus*, etc. There are also the following herbaceous forms namely, *Scirpus*, *Eriophorum*, *Carices*, and other sedges and grasses, besides *Sarracenia*, *Drosera*, *Solidago*, *Arethusa*, etc.

Sequence of the beds in the bogs.

The bogs are usually constituted of three or four different kinds of peat, namely (1) The yellow, greenish, or reddish living mosses in the upper part, which generally form a layer only a few inches in thickness; (2) the dead and dying roots of these mosses, constituting a dark brown, spongy, fibrous, coherent bed of greater or less thickness; (3) a blackish, partially decomposed stratum, more brittle than the last, the mosses having evidently undergone more decay, but still sufficiently tenaceous to form turf, and (4) a black layer of variable thickness, consisting largely of decomposed moss, etc., and holding stumps, roots and other portions of trees and shrubs, also more or less decayed. The last two generally graduate into each other. Occasionally the stumps and roots penetrate the underlying scil, but oftener appear as if spread out upon its surface.

Rate of growth.

The growth of peat bogs under favourable conditions is supposed to be tolerably rapid; [illegible] this depends largely upon local conditions of mean temperature throughout the summers, and upon the precipitation. No data respecting the rate of growth of the peat bogs are available in Canada; but in Europe some approximate measurements have been made.*

* In the valley of the Somme, in France, 3 feet of peat grew, in from 30 to 40 years. On a moor in Hanover a layer of peat from 4 to 6 feet thick formed in about 30 years. Near the lake of Constance a bed of 3 to 4 feet grew in 24 years. Among the Danish mosses a period of 250 to 300 years has been required to produce a layer 10 feet thick. Much must depend upon the climate, slope, drainage and soil. Sir A. Geikie, Text Book of Geology, 3rd. ed. p. 443.

RAISED PEAT BOGS.

(*Hochmoore of Northern Europe.*)

Reference has been made on a previous page to the fact that a number of the largest and most recently-formed bogs are raised in the centre, or some part distant from the border, above the general level, and a tentative explanation was suggested regarding the causes of this phenomenon. Raised bogs are common in Canada, especially those in a living state. All the dead bogs which the writer has seen, however, are flat. In the list given in succeeding pages those which may be classified as 'raised' are specified and the approximate elevation of the raised portion is sometimes noted. These appear to be exactly similar to the 'raised bogs' of European countries, particularly of Germany. The Canadian bogs are, however, not raised throughout the whole area of each, but have only a part occupying a higher position, and this is generally in the centre, or in some other part at a distance from the margin. The raised part always contains more water than the marginal or lower part, and the mosses are invariably in a living condition, and yellow or reddish to a considerable depth, whereas in the lower peripheral portion they are usually partially or wholly dead. By the words 'living condition' is, of course, meant the uppermost part of the peat moss, for in all bogs the peat is dead, or has ceased growing below the uppermost two or three feet. In the 'raised' bogs, however, the fibres or stalks of the living *sphagna* are much longer than in the lower parts, many being found several feet in length. This part of a bog always contains the cleanest and best moss for economic purposes, whereas in those which are dead the fibres, or stems of the *sphagna* are dark brown and undergoing decomposition.

Causes of raised peat bogs.

As stated on a former page the water with which the mosses are saturated even in the very highest parts of the 'raised bogs' is altogether due to the precipitation, the mosses acting as a sponge, and retaining it principally because there is little or no seepage or drainage from them. The fact of the mosses in this part absorbing all the rainfall and retaining it so tenaciously up to the point of complete saturation renders this portion of the bog a more congenial habitat for them than the margin, and therefore, the mosses grow more rapidly and attain a greater height there. Some portion of the water held in these higher or 'raised' parts of bogs may be due to capillarity; but it seems more probable that it is all due to the rain-fall.*

Water in bogs due to the rain fall.

* See paper by Prof. W. F. Ganong on 'Raised Peat Bogs' of New-Brunswick, Trans. Royal Soc. of Can. (2nd series) 1897-98 Vol. III, Sec. IV.

Further, the facts show that the extent and the elevation of the raised portions of the peat bogs are very closely related and dependent upon the extent and depth of the whole bog, that is, the larger the bog the higher and wider is the undrained or 'raised' part, and the smaller it is the less height will the raised portion attain.

Where largest peat bogs are found in Canada.

The peat beds with raised centres usually occur in places where the humidity is great and the summer temperature low. As we would naturally expect they are best developed near the coasts of Eastern Canada and of James bay and Hudson bay. Whenever a change takes place in their local surroundings and conditions, such as the clearing away of the forest, or in the draining and cultivating of any part of the bogs, the tendency of the 'raised' portions is to settle down. These changed conditions cause a seepage of the water contained in the bog as a whole, and in some cases a greater amount of evaporation, which affect its central raised part as well as the margin.

DISTRIBUTION OF PEAT IN CANADA.

Distribution of peat in Canada.

The geographical range of the peat mosses in the northern hemisphere is now tolerably well known. In North America they are found to have developed best within a belt or zone lying between the mean annual isotherm of 55 degrees Fahr. and the northern limit of trees, reaching their greatest extent in the more humid portions of this zone, and where the summer temperature is low. A line drawn from the Atlantic Coast in New Jersey through northern Pennsylvania, Ohio, North Indiana and North Illinois, central Wisconsin and Eastern Minnesota will roughly include the southern and western limits of the peat mosses so abundant in Eastern Canada, though local beds doubtless exist to the south of this. The boundary referred to passes into Canada through Western Manitoba, and crosses the Great Plains north of the International line. From Alberta westward it curves to the south-west, passing through south-eastern British Columbia re-crossing the International line, and entering the State of Washington, U.S.A. North of this limit there is an almost incalculable amount of peat between the Atlantic and the Pacific, much of it still unknown, as many of the early explorers paid little attention to peat beds. The largest bogs known lie east of the Great Plains in the James and Hudson bay region and in Ontario and Quebec. Peat has been noted by Dr. Bell as far North as Churchill river, and Mr. J. B. Tyrrell found it at Daly lake at the southern border of the Barren Grounds. It has also been observed by Dr. Bell, and Messrs. W. J. Wilson, D. B. Dowling

and Wm. McInnes in northern Ontario and easthern Kewatin in immense areas and by Mr. E. B. Borron in the Moose river basin. Besides the peat occurring in this region it has been found in Saskatchewan, Athabasca, northern Alberta and British Columbia west of the Okanagan, also in the Yukon territory, where it bears the name of 'tundra'. In most of the territories as well as in Manitoba and northern Ontario the bogs are generally known as 'muskegs'.

Localities of Peat Bogs.

Nova Scotia and Cape Breton.

Peat in Nova Scotia and Cape Breton.

1. On the north peninsula of Cape Breton, midway between the east and west shores, and on the watershed at the heads of the rivers there are a number of peat bogs the total area of which is computed at about 100 square miles ; depth from 3 to 5 feet.

2. In Richmond and Cape Breton counties between Loch Lomond and Mira, peat bogs also cover an area not less than 70 square miles : depth 3 to 10 feet.

3. South of Mabou there is a bog half a mile in diameter and 3 feet deep.

4. Between the Strait of Canso and Guysborough, several small bogs occur ; total area probably 50 square miles, approximate depth 5 to 15 feet.

5. Two miles south of Smithfield, P.O., Guysborough county, there is a bog $\frac{3}{4}$ of a mile long and $\frac{1}{2}$ mile wide. Depth from 10 to 12 feet, thinning out to the margin.

6. Along Liscombe river, in the same county, several peat bogs were seen the largest being $1\frac{3}{4}$ by $1\frac{1}{2}$ miles ; depth 2 to 10 feet ; also Taylor's bog, East branch, $1\frac{1}{2}$ by $\frac{3}{4}$ of a mile in extent ; depth in centre 10 feet or more.

7. Several small bogs occur near the last, about the headwaters of Sheet Harbour river ; area and thickness not ascertained ; but from 5 to 10 square miles ; thickness 5 to 10 feet.

8. About the headwaters of Tangier and Ship Harbour rivers, bogs comprising 300 to 400 acres of peat occur ; depth 5 to 15 feet.

9. In Queens and Shelburne counties from 400 to 500 acres of peat bogs have been noted, with a probable depth of from 5 to 20 feet.

10. The Aylesford or Cariboo bog, in the Annapolis valley, has been reduced by reclaiming and draining it to an area of about $1\frac{1}{2}$ miles long by $\frac{3}{4}$ of a mile wide. Depth from 1 to 10 feet.

11. The Savannahs, near Clyde river, in Shelburne, have been referred to by Dawson in Acadian Geology, but nothing is said by him regarding their area and depth.

12. Peat bogs were noted about the headwaters of Shoulie and Sand rivers, and in a number of other places in Cumberland county, but the area and depth are not known.

13. At the head of Missaquash river and bordering the lakes which exist there, peat beds occur. These are partly on the Nova Scotia side of the provincial boundary, and partly on the New Brunswick side. The approximate length is about three miles and the width a mile, including the lakes. Since my examination of the region I have learned that these bogs, and the salt marshes bordering them on the south-west, have been largely reclaimed and converted into arable land.

PRINCE EDWARD ISLAND.

Peat bogs in P. E. Island.

The peat bogs of Prince Edward island are shown on sheet No. 5 S.W., surface geology, New Brunswick series, and the area of each approximately delineated. They were described by Sir J. W. Dawson and Prof. B. J. Harrington in 1871, * and occur along the shores of Richmond and Cascumpeque bays.

14. At Black Bank, east of Stephens cove, Cascumpeque bay, there is a bog about three-fourths of a mile long and of nearly equal width; area 350 to 400 acres. The depth is 10 to 12 feet along the shore, the peat resting directly on white sand. Dr. Harrington calculates there are 1,777,248 tons of peat in this turbary. It is highest in the centre and devoid of trees; and the bottom layer is full of roots, trunks and branches in a tolerably good state of preservation. These roots, apparently *in situ*, were observed in places to be about two feet below high water mark. Erosion by the sea is rapidly reducing it. A Mr. Tuplin, who lives in the vicinity, informed us that about five feet is worn off the face of the bog every year.

15. Just west of Stephens cove another bog occurs, covering an area of nearly a mile lengthwise and having approximately the same width, containnig upwards of 500 acres. It is also in a living condition, is

*The Geological Structure and Mineral Resources of Prince Edward Island, by Sir J. W. Dawson, and Dr. B. J. Harrington, 1871.

highest in the centre and without trees. The depth of the moss is from 10 to 15 feet, and the quality is excellent. Messrs. Dawson and Harrington did not examine this bog.

16. A peat bog situated on the northwest side of Richmond bay called the Squirrel Creek bog by Dr. Harrington, has an area of about 800 acres, though the workable portion is not more than 500 acres. Dr. Harrington calculated that it contained 500,000 tons of air-dried peat. The bog is also raised in the centre and destitute of trees. The depth varies from 4 or 5 feet around the border to 11 or 12 feet in the centre. The peat is of good quality most of it being fibrous turf. As remarked by Dr. Harrington "the higher portion of the bog is much wetter than the lower part around the border, and here and there were little ponds containing water plants. The bottom of the ponds could not be reached with a rod more than 12 feet long."

17. At Lennox Island, Richmond Bay, there is a strip of peat on the northeast side facing the sea. It appears to be undergoing rapid erosion, the bank being constantly worn away by the waves, and at high tide the water comes to within three feet of the top, the whole thickness of the bog being about 7 feet. At low water mark the roots and stumps of trees were seen in the bottom of the peat moss. The area of this bog is about 50 acres. It is composed of clean *sphagnum*, slightly decomposed in places in the upper part, and of fibrous peat beneath.

18. Near Portage station, P.E.I. railway, there is a peat bog covering probably about 100 acres. Depth 8 to 10 feet.

19. Halfway between Miscouche and Nicholas stations another was noted having about the same area and depth.

NEW BRUNSWICK.

Localities of peat bogs in New Brunswick.

The peat bogs of this province were examined and studied by the writer during the investigation of the surface geology between 1882 and 1900. They are nearly all shown on the maps of the surface geology published by the Geological Survey and are briefly described in the reports which accompany these. Little or nothing has been done towards utilizing the great moss bogs which this province contains, wood being still abundant and cheap, and coal obtainable from the Nova Scotia mines at a moderate price.

20. In Charlotte county there are a great number of bogs, as it borders the Bay of Fundy and its climate is humid and comparatively cool. Commencing in the western part small peat bogs were observed

in the following places:—(1) At Moannes stream; (2) south of Basswood ridge; (3) along the old Woodstock road near York county line; (4) near Barber dam; (5) at Lynnfield, 3 miles long and ½ to ¾ miles wide; (6) near Watt Junction, C. P. railway (7) between Watt Junction and St. Stephen, several bogs, the largest at Meadow station, ¾ of a mile long by half a mile wide; (8) near the head of Waweig river, length about 2 miles, width ¼ to ½ a mile; (9) west of a branch of same river, near Shore Line railway, about ½ a mile in diameter; (10) east of Riordan's Corner, 1 mile by ¼ mile; (11) between Pennfield Ridge and Seely's Cove, about a mile from last mentioned place; about ½ a mile long by 150 yards to ¼ of a mile wide; (a raised bog); (12) at Little Popelogan river, near Shore Line railway, fully 2 miles long by ½ a mile wide, occupying several small basins. (13) On road from Lepreaux village to Point Lepreaux about 2 miles from Shore Line railway, about a mile long and ¼ to ½ a mile wide; (14) several small bogs on east side of Lepreaux river, north of railway, probably a ¼ of a mile in diamater more or less; (15) north of Musquash harbour, and apparently occupying the old valley of discharge of Ludgate and Spruce lakes. Area about 450 acres. Some years ago buildings and machinery were erected here for the preparation of moss litter, but they were destroyed by fire and operations have not been resumed. The average depth of all these peat bogs is from 5 to 10 feet, but a few, notably those at Musquash and Lepreaux, are 15 feet or more in the deepest parts.

21. Peat bogs of some extent occur at the Mispec barrens, St. John county, but the area and depth were not ascertained.

22. In Sunbury county a large peat bog occurs at the head of Little river. It is surrounded by forest and is a favourite resort for moose and deer. Great quantities of cranberries grow upon it. Other peat bogs are reported to exist in that tract of wooded country lying between Canaan and Salmon rivers, tributaries of the St. John.

23. In York county as in Charlotte, there are a number of bogs, most of these also small. (1) Along the St. Andrews and Woodstock branch of the C. P. railway, from the southern boundary of this county northward to Canterbury station, several were noted, and others eastward in the vicinity of Magaguadavic lake. (2) A peat area occurs along the Pokiok river, west of the settlement of the same name. (3) A bog lies at the head of the Mactaquac river, west of Staples settlement. (4) Between Howland ridge, near Millville, and Lawrence Peak, near Becaguimic lake there is a long bog containing excellent *sphagnum* moss.

24. In Westmorland county two or three miles north of Canaan station, Intercolonial railway, a bed of peat about 2 miles long and from ¼ to ½ a mile wide occurs: depth 5 to 10 feet.

25. In Kent county two well developed peat bogs lie on the north side of the Kent Northern railway, from 3 to 6 miles west of Kingston or Rexton, as it is now called. The one nearest the town is 1½ to 2 miles long and ¼ to ½ a mile wide, the other is smaller: depth from 5 to 15 feet. They are 'raised bogs'.

26. A bog skirts the north side of Kouchibouguac harbour for 1½ miles or more: width ¼ to ½ a mile.

27. At Point Escuminac, Northumberland county, there is a large bog,—about 4 miles long and 2 wide, which is not less than 20 feet deep or more. Like other raised bogs it is nearly destitute of trees, though in many places covered with heath plants.

28. At Point Cheval on the Miramichi bay there is an interesting peat bed, much of which is dead, and composed of other plants besides mosses. Roots of trees in a good state of preservation are abundant in the bottom.

29. At the mouth of Tabusintac river, on the north side of Miramichi bay a well developed peat bog occurs, known as the 'Black lands.' Which is upwards of 2 miles long, and a 1½ to 2 miles wide. In some places on the eastern side it is washed by the sea. It is treeless, or nearly so, raised in the centre, and has a number of small fresh water ponds occupying holes in its surface.

30. At Barreau point a peat bog of some extent occurs on the west side of a lake or lagoon: area probably two or three square miles. It is bordered by marsh.

31. A bog or 'cranberry barren' 1 or 1½ miles long, and of variable width, not exceeding half a mile in the widest part, lies at the southern end of Pokemouche harbour. Its depth is probably ten feet or more and it is composed of good clean moss.

32. On the neck of land between St. Simon inlet and Pokemouche harbour there is a fine peat bog, which covers an area of 1,000 acres. Most of the peat is clean *sphagnum* and remarkably free from impurities. Like most of the larger bogs of New Brunswick the central part is raised 10 to 15 feet above the margin and is water soaked to the surface.

33. About four miles north-east of Shippegan gully, on the east side of Shippegan island, a bog 3 miles or more in length and half a mile

to a mile in width was noted. The peat was seen to be about 10 fee
thick in the bank, and to be clean moss. The bottom of the bog is 8
to 10 feet above high water mark,

34. South of Pigeon hill, Shippegan island, another bog was obser-
ved between two lagoons, a mile and a half long or more and from a $\frac{1}{4}$
to $\frac{1}{2}$ a mile wide. It contains moss of good quality.

The Miscou bog.

35. The largest peat bog of New Brunswick is that of Miscou island which covers more than half of its superficies. Its greatest length is about 6 miles and its extreme width $3\frac{1}{2}$ to 4 miles. The surface of the central part is from 20 to 25 feet above sea level, and as the bottom of the peat is seen in some places to be in the littoral, it is probable that the extreme thickness is not less than from 25 to 30 feet. This central part is, as usual, the highest, the surface of the bog having a gentle slope thence to the periphery. It is, for the most part, treeless, and dotted with small ponds of icy cold water. The larger part of the bog is composed of pure *sphagnum*; but its inaccessibility, especially in winter is against the utilization of the peat for economic purposes, there being no other way of reaching the island than by the sea.

36. On the road between Pokemouche and Caraquet, about half a mile north of Waugh river, a peat bog is crossed. It is about half a mile long and from 200 to 300 yards wide. Distance from the Caraquet railway about three miles.

37. A peat bog occurs in the middle of the peninsula terminating at point Mizzinette, in the eastern part of Gloucester county. Though treeless it is surrounded by the forest. Area and depth not ascertained. Two small lakes in it are drained into Blue cove.

38. At Bartibog station, Intercolonial railway, a peat bog of irregular form was noted. It is crossed by the railway and expands towards the east. The surface is without trees, but small black spruce and hacmatac grow on the marginal or thinner portions. It is probably a mile or more in length and fully half a mile wide; depth 5 to 10 feet.

39. Two and a half to three miles north of the same station another bog occurs of approximately the same area. These bogs contain workable peat and their proximity to railway communication enhances their value.

40. A large peat bog exists between the headwaters of Portage river, an affluent of the North-west Miramichi and Gordon brook which flows into the Nepisiguit river. It lies is about six miles west of the Intercolonial railway.

41. At the head of the north branch of Green brook, a tributary of the Bartibog river, a peat bog occurs, and another is reported to lie about two miles directly west of Beaver brook station, Intercolonial railway. Two or three miles north-east of Bartibog station, Intercolonial railway, a bog of considerable extent is said to exist, and another at the head of Little Eskedilloc, an affluent of the Tabusintac river. Two other peat bogs are reported by hunters and lumbermen to lie along the Big Eskedilloc river, one on the north, or between this river and the Little Eskedilloc, a short distance west of the old Chatham and Bathurst road, and the other on the south-east side of the largest of these rivers, three to four miles east of the post road mentioned. Moose caribou plains in New Brunswick

These bogs are known locally as 'moose' or 'caribou' plains, and are of great extent like many other peat bogs upon the Carboniferous area. The peat is not likely to be deep, but is, nevertheless, mostly clean *sphagnum* and of economic value.

42. At the head of the north-east branch of Portage brook, an affluent of the Nepisiquit, near the portage route between this river and Upsalquitch lake, a peat bog was observed: length about 1 mile, in a north-west and south-west direction, width from a quarter to half a mile. It seems to occupy a former lake basin and contains good living peat.

43. (1) On the south side of the Baie des Chaleurs, at Belledune, we find two peat bogs. The one nearest Belledune Point rests on a bed of marl, (2) South of Charlo river near the coast of the bay there is a small bog which is probably of economic value. The Intercolonial railway runs through a part of it.

QUEBEC.

Peat abounds in the province of Quebec. The soil and climate seem to be peculiarly favourable to the growth and accumulation of this material, and some very large bogs are found in the valley of the St. Lawrence, and other valleys opening into it, from Matane river westward. Large bogs are also reported from the upper Ottawa and Lake Abitibi region. The quality of the mosses composing the bogs too, is excellent, the most of these being in a growing and healthy condition. Abundance of peat in the province of Quebec.

44. The largest peat area in the province is said to be on Anticosti. Here peat is reported to extend along the south side of the island for upwards of 80 miles, namely, from Heath Point to within 8 or 9 miles of South-west Point, with an average breadth of 2 miles. Anticosti.

Its thickness as observed on the coast is from 3 to 10 feet. Between Sou[illegible] west Point and the west end of the island many smaller bogs varying in extent from 100 to 1,000 acres, occur.

Coaque.

45. Peaty areas are of frequent occurrence on the Lower Carboniferous rocks of Bonaventure county, but they are of little depth, and most of them have not yet advanced beyond the wooded stage. One of these is crossed by the first road to the second concession north of Bonaventure river and is of considerable extent. A small one was seen on the road going back on the south side of Cullin's river. Similar small bogs were observed around the margin of the lakes behind New Carlisle and elsewhere.

46. Crossing from Baie des Chaleurs by the Intercolonial railway to the St. Lawrence Valley a peat bog was seen on the west side of Metapedia lake one or two miles north of Amqui station.

47. Between Sayabec and Moise stations another considerable extent is passed over by the railway.

St. Lawrence valley.

48. A bog in three separate belts extends from a point 2 to 3 miles east of Rimouski to Ste. Luce station and beyond, a distance of 8 to 10 miles. Width of three taken together $\frac{1}{4}$ to $\frac{1}{2}$ a mile; depth 1 to 6 feet.

49. East of Rimouski river another 3 to 4 miles long, and $\frac{3}{4}$ of a mile wide lies, which is 5 to 12 feet deep,—in one spot 30 feet.

50. At St. Eloi and Isle Verte stations I.C.R. a bog $4\frac{1}{2}$ miles long occurs on the south side of the track: width $\frac{1}{4}$ to $\frac{1}{2}$ a mile, depth 5 to 10 feet.

51. At Cacouna station there is a bog about two miles in length, and $\frac{1}{4}$ to $\frac{1}{2}$ a mile wide, 2 to 10 feet deep.

Rivière du Loup bog.

52. South of Rivière du Loup, a bog of about 6,000 acres occurs. Maximum depth 18 feet, thinning out at the edge to a foot or two. The Temiscouata railway runs along its western border.

53. Between the Intercolonial railway and the St. Lawrence river near the south-west side of the Rivière du Loup Seigniory, a bog 3 miles long extends in a north-east and south-west direction: breadth half a a mile: depth 4 to 8 feet.

54. Another occurs at L'Islet du Portage, one mile south east of Ste Helene station, I.C.R. Length north-east and south west, one to two miles, probably about $1\frac{1}{2}$ miles; width, a quarter of a mile: depth 8 to 10 feet. A third lies 6 miles S.E of St. Denis; probable length a mile, width $\frac{1}{4}$ mile, and depth about 8 feet.

55. North-east of Rivière Ouelle station, I.C.R. there is a bog of about 4000 acres; depth 3 feet at the margin to 20 or 25 feet at the centre. Attempts were made some years ago to work this bog, but except cutting some drains in a part of it nothing was done.

56. East of Ste. Catherine, on the Quebec and Lake St. John railway, there is a bog which is about 2 miles in diameter, and which has a depth of from 5 to 10 feet, in some spots deeper.

57. On the road between Cap. Santé and L'Enfant Jésus there is a bog with a breadth of half a mile.

58. There are several bogs west of Levis along the Grand Trunk and Intercolonial. The first is just west of Chaudière station and is about $\frac{3}{4}$ of a mile in diameter. A mile and a half east of Craig's crossing G.T.R. another occurs, $\frac{1}{2}$ a mile in diameter; and three miles west of this crossing a third was seen, 2 miles long and 1 mile wide. The depth of all these does not seem to be more than from 5 to 10 feet.

95. Of the several bogs crossed by the I.C.R., the first was noted at Rivière aux Neux, and is $\frac{3}{4}$ of a mile long and half a mile wide; depth 5 or 6 feet.

60. A bog in Lotbiniere Seigniory, at Grand Rivière du Chêne, is 2 miles long and $\frac{3}{4}$ of a mile wide.

61. The Lotbiniére and Megantic railway crosses three peat bogs between Lyster and Kingsbury Jct. I.C.R. The first is 2 miles long by one wide, and shallow; depth not exceeding 5 feet. The other two are small and unimportant.

62. Peat bogs were noted on the water shed in the vicinity of Black lake, St. Francis and Aylmer lakes, near the Quebec Central railway.

63. In Bulstrode, Arthabaska county, a bog 2 miles long and probably a mile wide occurs. Depth 5 or 6 feet. This seems to be the bog in which Mr. Hodges carried on operations in 1864-70 (see p. 30) Bulstrode bog.

64. Along the same railway three miles S.E. of St. Célestine a bog from a half to three-quarters of a mile in diameter was noted. Depth 5 to 8 feet.

65. Four miles west of Farnham, a bog nearly 4 miles long by 2 miles wide occurs. Depth not known, but the central parts are probably 10 feet. In some places it is quite shallow and has been brought under cultivation.

66. Five miles S. E. of Farnham another bog 2 miles long and 1 to 1½ wide was noted. Depth unknown, but must be 5 feet or more.

67. South-east of Waterloo there is a bog about a mile long and half a mile or more in width. Depth from 5 to 10 feet. Mostly dead peat.

68. Near Ste. Brigitte in the county of Rouville there are peat bogs, portions of which are now under cultivation.

69. The large peat bog in the Seigniories of Lacolle and De Lery, and in the townships of Sherrington and Hemmingford, has been partly brought under cultivation. At present, a part of it, about a mile and a half long by a mile in width only, was noted at the line between the townships mentioned; depth about 10 feet.

70. South of Hemmingford there is another about a mile long by half a mile wide; depth 5 to 10 feet

71. On the Canada Atlantic railway between Missisquoi bay and the Richelieu river a bog containing fine, living moss occurs. Area about a square mile; depth 5 to 10 feet.

St. Dominique bog.

72. At St. Dominique there is a bog which, in the sixties, was 5 or 6 miles long by 3 or 4 wide, with a maximum depth of 18 feet. Since that date a considerable area of the shallower parts has been brought under cultivation.

73. There is also a peat bog at Longueuil on the Chambly road, on which some work was done in the early sixties. Portions of this have also been brought under cultivation.

74. North of the Ottawa river, in Grenville, there are several bogs, one covers about 36 acres and is 10 feet deep; another of about the same extent is 15 feet deep; and a third of 30 acres is also said to be 15 feet deep.

75. In Harrington one bog of 10 acres is 10 to 15 feet, and another in the same township containing 60 acres is 25 feet deep in the thickest part.

76. To the east of this in Mille Isles Seigniory a bog occurs on the double range, on the road from St. Janvier to St. Jerome: length half a mile, area ⅜ of a square mile; average depth 8 feet, the depth varying from 2 to 18 feet. Another bog a ¼ of a mile wide was seen near St. Janvier: and a third occurs north of the church of Ste. Anne des Plaines on the road to New Glasgow, extent about a mile, probable average [illegible]h 5 feet.

77. Near New Glasgow, Great Northern railway, a bog about 1 square mile in size occurs; depth about 5 feet

78. In the Seigniories of St. Sulpice and L'Assomption, a bog of about 1,100 acres was noted. Depth 2 to 15 feet. Result of ten trials gave average of 10 feet.

79. In the Seigniories of Lavaltrie and Lanoraie two large bogs run parallel to each other for about 8 miles in a north east and south-west direction; width from half a mile to 2½ miles. Area 12 to 15 square miles; depth 4 to 14 feet, average 11 feet. A third bog lies two miles from St. Laurent, length over 5 miles; width half a mile to 2 miles; area about 3 square miles; average depth 5 feet

80. On the road along the west side of St. Maurice river (Fief St. Etienne), at Les Grès, a bog half a mile in diameter is crossed; about 5 feet.

81. At Garneau Jct. Grand Trunk railway, three bogs occur. The southernmost one is about ½ of a mile in area, and 5 feet deep. The other two are comparatively insignificant. Further north two others are seen each about ½ of a mile in area; depth also about 5 feet.

82. Near the Champlain river, a bog occurs; area about 1½ square miles; depth 5 feet.

The foregoing list is necessarily incomplete. A large number of bogs occur in the forest-covered part of the province, and these, besides many of the smaller have not been noted in our examination; but it includes nearly all that are accessible by railways, by roads, or water communication.

Below Quebec city all the bogs are in a green living condition, west of that many of them have been burnt over, or partly reclaimed for farming purposes. Generally speaking, the peat is thinner upon the St. Lawrence plain than where the country is undulating or hilly.

ONTARIO.

Peat bogs are also very abundant in this province, and many of them are large, comprising thousands of acres. Fewer raised bogs are found here than in Quebec or the maritime provinces however, much of the peat which occurs in the cleared parts of the country being dead, or having ceased to grow. In the newer and unsettled areas of western and northern Ontario the most extensive bogs in Canada are found, all in a growing and well-preserved condition.

Peat in Ontario.

83. In the level region of eastern Ontario between the St. Lawrence and Ottawa rivers several peat bogs occur. A considerable area of peat is reported to lie in the rear of the seigniories of Vaudreuil and Rigaud. In Caledonia, ranges 7 and 8, Alfred, the Canadian Pacific railway traverses a shallow bog for 4½ to 4 miles. Its width does not exceed 1½ to 2 miles and the depth 3 to 4 feet. A considerable part of this bog on both sides of the railway track is now being burned over and brought under cultivation.

84. In Gloucester, 3rd, 4th, and 5th, ranges and passing into Cumberland township, county of Russell, there is a large peaty tract, known as the Mer Bleue which contains approximately 5,000 acres with a maximum depth of from 25 to 30 feet, thinning out towards the margins. Towards the west it runs into three points from two of which brooks flow. The Canadian Pacific railway passes along its north side, and the Canada Atlantic on the south. The centre of the bog is only about 8 miles from Ottawa.

85. Another bog of considerable size occurs on the line between Gloucester and Osgoode townships, county of Carleton, range 4, about four miles east of the Rideau river and extends into the latter township several miles. A third smaller and apparently shallow bog is crossed by the Ottawa and Prescott railway some miles south of Chaudiere junction.

86. Three large areas of peat, from 1,000 to 3,000 acres each, occur in Nepean and Goulburn, county of Carleton; one of them to the east, and two to the west, of the village of Richmond. These have also been partially brought under cultivation.

Newington. 87. A large peat bog is situated in the county of Stormont, at Newington, 15 miles from Cornwall, and 40 from Ottawa, near the line of the Ottawa and New York railway. It contains 1,000 acres or more and ranges in depth from 17 to 30 feet. It is now being wrought by the Dominion Peat Products, Limited, of Ottawa, (see later page for description of process.)

Brockville. 88. About two miles north of Brockville, just west of the Canadian Pacific railway track, a large bog or morass, 1,400 acres in extent, occupies a basin, part of which was formerly covered by a lake. An artificial cutting has, however, drained this off, exposing a bed of mosses, remains of grasses, aquatic plants, etc. The maximum depth is 40 feet or more, the upper 3 feet being of comparatively uniform character in certain zones, while in others transported material from the slopes surrounding the basin is met with in greater or less quantity.

Below a depth of 3 feet the character of the material changes to a dark plastic mass. Quite recently a new company has acquired this property and is introducing the Sahlstrom process, a European one (For details regarding this process see a later page).

89. At Perth, in the township of Drummond, a peat bog occurs, known locally as the Blueberry marsh, covering some 2,000 acres. Thirty five acres of this were acquired by the Lanark county Peat Fuel company some years ago and an attempt made to work it for fuel, but so far without success. The average depth of the bog is about 8 or 10 feet. Very little true moss is found in the peat here, the remains of grasses, aquatic plants and weeds constituting the chief part of the bed.

90. Peat is found in the third and eighth ranges of Beckwith, to the east of Missisquoi lake, and an area of about 3,000 acres of this material occurs in Westmeath in the rear of front A, and from the first to the fifth range behind it.

91. In the ninth and tenth ranges of Huntley, county of Lanark, there are about 2,500 acres of peat, which in some parts has a thickness of 8 or 10 feet, while in other parts the bottom was not found at a depth of 15 feet.

92. A peat bog occurs on lot 12, 4th and 5th ranges of Sheffield, county of Wentworth, where it overlies a bed of marl, and extends over 300 or 400 acres. The average thickness is about 4 feet.

93. Peat bogs occur in Prince Edward county, and attempts were made to work these for fuel some time ago, but apparently without success, as nothing has been done there for some years.

94. At Galt, Waterloo county, there is a small peat bog, where work was formerly carried on.

95. The Holland river swamp in the counties of Simcoe and York, which contains approximately 20,000 acres is said to be a quaking bog and the peat, or decayed vegetable matter is, in places, upwards of 9 feet deep. At some depth below the surface it is reported to contain true peat (*Sphagnum*). Holland river swamp.

96. The Beaverton bog near the village of the same name, at Lake Simcoe occupies only about 100 acres. Like many of the other bogs of Ontario it is composed of the dead and blackened remains of woods, rushes, grasses and aquatic plants with little true *Sphagnum*. Its depth is about 40 inches, but the upper 26 inches only are available for peat fuel. Mr. Alex. Dobson, the owner of this bog devised new Beaverton bog.

methods of drying and briquetting the material which will be referred to later on.

Trent valley bog.

97. At Victoria, near the Trent Valley Canal, about two miles north of Kirkland, there is a peat bog of 110 acres; depth 10 feet or more. Another bog of 130 acres lies north of this on higher ground and is better situated than the last as regards drainage, and facilities for drying the peat in the air.

98. South-east of Victoria in the basin of Balsam lake another bog occurs having an area of about 30 acres; and south-west of the latter a third and smaller one lies. Depth of these varies from 4 to 10 feet though in one spot 55 feet.

99. A peat bog of about 25 acres occurs near Berlin, Waterloo county. It is underlaid by a deposit of shell marl. Similar small bogs are reported from other parts of the same county.

Stratford bog.

100. A bog known as 'huckleberry marsh' is situated about 8 miles north of Stratford. It contains about 2,000 acres, depth from 5 to 10 feet. Here the manufacture of peat fuel was also undertaken in 1902 with the Dobson plant, but was discontinued in 1903. The peat is nearly all dead.

Welland peat bog.

101. In Welland county near the 'feeder', of the Welland Canal there is one of the largest bogs found in the settled parts of Ontario, containing probably 5,000 acres. The average depth is from 4 to 8 feet. It is now several years since operations were begun in this bog, meantime experiments in drying and pressing the moss have passed through a number of stages. The peat here is somewhat different from that of the Beaverton and Stratford bogs. It is wetter and requires different treatment in the drying process, in order to deprive it of the moisture it contains. Owing to the great quantity of roots of trees and shrubs the peat has to be carefully screened before it is put into the breaker. This bog is nearly flat and except in the centre the peat is dead. Considerable quantities of ash must be found in it around the marginal or thinner parts.

Rondeau peat

102. The Rondeau bog at Rondeau harbour on the shore of Lake Erie, in the county of Kent, extends along the water-front a distance of several miles with a width of a quarter to half a-mile. Sand bars separate it from the waters of the harbour. It occupies an area of about 1,500 acres. The Western Peat Fuel Company, Limited, of Chatham, owns 328 acres of the bog, on which they have erected buildings and installed the necessary plant for manufacturing fuel. The depth of the peat is variable, ranging from 1 foot to 30 feet. Very little, if any, peat moss (*sphagnum*) is met with in the beds.

103. A bog of some extent occurs at Redmonds Pond, 2 to 3 miles below London on the north west side of the Thames river.

104. Peat bogs are reported from the valley of Nottawasaga river, near the mouth, one of these occurring at Jacks Lake.

105. Peat exists in some places on the borders of Lake St. Clair, also in parts of the district along the north side of Georgian Bay. Large tracts of peat occur along the line of the Canadian Pacific railway west of Lake Nipissing and between Port Arthur and Rat Portage.

106. In the lake Abittibi region peat bogs are common. The Great Muskeg described under the next number reaches this far east.

107. Mr. E. B. Borron who explored the basin of Moose river* reports that there are in the territory belonging to Ontario, south-west of James bay, not less than 10,000 square miles overlaid with beds of peat, the depth of which is often six feet, and is, perhaps twenty feet or more in some places. The climate and natural conditions here, are most favourable to the growth of the *sphagnum* moss, and consequently immense bogs have been developed. Great Moose river peat area.

108. South of the Canadian Pacific railway in the Thunder Bay and Rainy River districts, and along the Canada Northern railway there are a number of peats bogs of greater or less area.

109. In the country between the Missinaibi and Albany rivers with Kenogami river to the south-west and James bay on the north-west, there are, according to Mr. W. J. Wilson, no less than 3,000 square miles of peat, probably 5 or 6 feet deep or more.

110. The same explorer informs me that on the Little Current and Drowning rivers there are probably about 1,200 square miles covered with peat varying from 2 to 5, or 6 feet in depth.

MANITOBA.

111. There is a large peat bog at St. Boniface, composed, it is said, of good peat. The Peat Products Company, Limited, of Ottawa, have an option on a considerable part of it. St. Boniface bog.

112. Mr. D. B. Dowling states that in the south-east corner of the province near the Canadian Pacific railway there are a number of bogs, muskegs, or flat swampy areas. The plants in these are largely aquatic forms, grasses, reeds, etc., and there is little, if any, true *sphagnum* moss.

* Report of E. B. Borron, Ont. Sess. Papers, 1887, Vol. XIII, part 1.

Julius muskeg.

113. The Julius muskeg, or peat bog, occurs partly in three townships adjacent to each other, east of Winnipeg, and in the vicinity of the Canadian Pacific railway between Whitemouth and Molson stations. It is said to contain about 100 square miles of peat.

114. East of Brokenhead river there is a peat bog or muskeg extending northward from the Canadian Pacific railway. It is about 30 miles long with an average width of three miles.

Big Grass Marsh.

115. North of Gladstone station, north west branch of the Canadian Pacific railway, the Big Grass marsh occurs, covering about 75 square miles. This is called a peat bed though formed chiefly of grasses, sedges and aquatic plants.

NORTH-WEST TERRITORIES.

Albany river.

116. Dr. R. Bell reports that peat is found along the Albany river for 150 miles. On ascending, it is first seen about 12 miles from its mouth, and appears along its course, with [illegible] interruptions, as far up as the forks of the Kenogami. A wooded belt stretches along both sides of the Albany for a long distance and the beds of peat lie behind these.

117. In the same report Dr. Bell also states that between Martins falls on the Albany and Attawapishkat river, *sphagnum* bogs extend across the country for 60 miles.

Attawapishkat river.

118. From the mouth of Attawapishkat to Black Fence river, 135 miles, there, are according to the same authority, swamps and peat bogs, and for 80 miles below the junction of the two branches, *sphagnum* bogs occur all along. Indeed the whole country generally speaking, below Lake Landsdowne contains *sphagnum* swamps with small scattered tamarac and black spruce trees. Portions of it are however, covered more or less thickly with a larger forest growth. The peat bogs apparently stretch across north-westward to the Ekwan river. This is corroborated by what Mr. Dowling observed there. *

Kapiskau.

119. On the Kapiskau river, Mr. Wilson informs me, there are about 2,000 square miles of peat.

Ekwan.

120. Peat or muskeg occurs along the Ekwan river nearly from the mouth to about 130 miles above it, according to Mr. D. B. Dowling, and the bogs have an average width of probably 25 miles on each side. The depth is from 1 to 5 or 6 feet. On the higher parts of the

* Report of Progress, Geol. Surv. Can. 1877-78, Part CC. ; *Ibid.* 1879-80, Part C. ; Annual Report Geol. Surv. Can. Vol. II, 1886, Part G.

area the moss is often wanting and a tree growth prevails ; but most of it is covered with *sphagnum* except in the river valleys.

121. On the Winisk river Mr. Wm. McInnes says there is a bog or muskeg about 100 miles long and of unknown width, but apparently extending to the parallel rivers on both sides. Winisk.

122. Dr. Bell reports peat as occurring at or near the mouth of Nelson river 4 feet thick and running a long distance inland He also observed it along the route from Split lake to Fort Churchill, especially at the creek north of the Hudson Bay post at Split lake ; at the outlet of Assean lake ; at the southern part of Waskaiowaka lake on both sides ; and at lagoons 12 miles south of Recluse lakes, where it is 4 feet thick on the top of the bank. Nelson river.

123. At Oxford and Knee lakes, Keewatin, Dr. Bell also reports peat, and *sphagnum* moss was noted in low places north-west of Swampy lake. Below Knee lake there is a good bed of peat of considerable extent with a perpendicular face of 4 or 5 feet above the level of the water. Peat of fine quality also occurs at Clearwater and Swampy Portage lakes. Oxford and Knee lakes.

124. Mr. A. P. Low states 'that between Favourable lake and Muskratdam lake the country is a vast level swamp, broken only by a few knobs of gneiss.... The swamp is covered with moss peat and supports a small growth of black spruce and tamarac.'

125. The *sphagnum* moss will probably be found growing northward to Churchill river and beyond it. Indeed, it would seem from the facts obtained by geologists and explorers in northern Ontario and the southern part of Keewatin territory that a great peat zone extends from the north-western part of the province of Quebec westward and northward along James and Hudson bays into Keewatin as far as the northern limit of trees, passing into Saskatchewan, Athabaska and Mackenzie. The peat in this zone seems to occur in beds of greater or less extent along rivers, around lakes, and upon the lower grounds. Between the bogs there are drier areas covered with a forest growth. Much of the peat is doubtless thin, and if burnt over, as is now being done in some parts of the St. Lawrence valley good soil might probably be found underneath. Churchill river. Peat in Saskatchewan, Athabaska and Mackenzie territories.

126. Peat is reported as occurring at a lake at the southern border of the 'barren grounds', in Mackenzie territory, by Mr. J. B. Tyrrell.

127. Dr. R. W. Ells states that along the upper waters of the North Saskatchewan river, near the eastern base of the Rocky Mountains there is a peat bog not less than 10 miles in length.

Mr. Tyrrell also speaks of 'wide marshy tracts either covered with moss or forming impassable muskegs' occurring along the upper North Saskatchewan, near the Beaver hills.

No measurement of the areas of the peat bogs west of the Great Lakes and James and Hudson bays has yet been attempted, except perhaps, in Manitoba, and even an estimate of their extent can only be the merest approximation, but it is certain that they cover many thousands of square miles, and that a large number of bogs exist which have not yet been seen by any explorer.

From the data at hand the following summary of the areas of peat in Canada, with the average depth, has been calculated. East of Lake Superior the figures are at least approximately correct: west of that they are largely estimated.

Total area and depth of peat in Canada.

QUANTITY OF PEAT IN CANADA.

	Square miles.	Average depth in feet.
Nova Scotia and Cape Breton	250	8 to 10
Prince Edward Island	10	8 " 10
New Brunswick	250	8 " 10
Quebec (in settled parts)	500	8 " 10
Ontario (" ") 450		
(Moose river Basin, etc.) 10,000	10,450	5 " 8
Manitoba	500	6 " 10
North West Territories (estimated)	25,000	5 " 10
British Columbia and Yukon Territory	No data.	
	36,970	
Or in round numbers	37,000	

The above figures are doubtless too low, as there must be a large number of peat bogs in Canada not yet observed or taken into account. Russia, it is stated, has 67,000 square miles of peat, and it is not at all improbable that this country has an area equally as large.

ON THE MANUFACTURE OF PEAT FUEL, MOSS LITTER, ETC.

Manufacture of Peat Fuel Moss Litter, etc.

The peat beds of Canada, more especially in the eastern provinces, are now beginning to attract the attention of practical business men in view of the depletion of our forests and the increasing prices of coal, and attempts are being made to utilize them in the production of fuel, coke, and moss litter. Many of these attempts have however, only resulted in failure, after spending years of labour and considerable sums of money. This has arisen principally from the great difficulties encountered in extracting the moisture from the raw material, and in the lack of adaptation in the processes employed, to the climatic and other conditions of this country. Nevertheless, with the immense stores of peat which Canada affords, almost at our doors, it seems a foregone conclusion that the difficulties referred to should be overcome, if not by methods devised in this country, then by some of the processes in use in the different countries of Europe where circumstances have compelled the utilization of this product, and where the peat industry has been placed on a paying basis. Another difficulty and perhaps, the chief one, is the fact that our people do not care to use prepared peat in other than a condensed or pressed form, no stoves or fire-places having been made suitable for burning it by itself. A large portion of the experimental work in regard to converting our peat into a form for domestic or other uses has been carried out, too, without investigating the processes which have proved to be valuable in European countries. But although little success has attended the efforts of those interested, yet there seems to have been some progress made. That Canadians, should not be able to devise and carry out methods for preparing fuel from this material as well as the people of other countries seems unreasonable to suppose. The peat is practically the same as that of northern Europe, being largely sphagnaceous, and containing by analyses nearly the same constituents. The natural conditions as to climate, length of the summer season, heat and cold, drought and rainfall are not so dissimilar, and yet it is well known that in Sweden and Norway, northern Germany, Bavaria, etc., the manufacture of peat has been carried to success and very large quantities of it are used for domestic purposes, in smelting and metallurgical works, also for generating steam and in various ways. But only in three places in Canada are processes now in operation capable of producing prepared peat, namely at Beaverton, Brockville, and Newington, in the province of Ontario. Of these three processes the Beaverton plant, invented by Mr. Alex. Dobson of that place, is the only one in continuous operation. Here the peat is dried and pressed into briquettes, thus occupying much less space than

Plants operating in Canada

the crude article. The 'Economi' Process,' a German invention, has been introduced at Newington by the Dominion Peat Products Co. by which machine peat is prepared; and the 'Sahlstrom Process,' a Swedish one, now about to be employed at Brockville, are those referred to.

THE FUEL VALUE OF PEAT.

Peat includes a number of substances of unequal fuel value, the most recently formed, spongy, light-brown kind approaching wood in composition, while the denser pitchy-brown, compact material, obtained from the lower part of the older bogs, may perhaps be compared with lignite. Unlike wood, however, it contains incombustible matter in variable quantity, from 5 to 15 per cent, or even more. Much of this, however, when the amount is large, is often due to sand mechanically intermixed. When air dried the proportion of water is from 20 to 40 per cent. When these constituents are deducted, the average composition is found to be :—

Composition of peat.

Carbon	52 to 66 per cent.
Hydrogen	4·7 to 7·4 "
Oxygen	28 to 39 "
Nitrogen	1·5 to 3 "

Average air-dried peat may be taken as having a calorific value of 3000 3500 units, and when freed from water by a heat of 100°C, and with a minimum of ash (4 to 5 per cent), of about 5200 units*, or from a quarter to one-third more than that of an equal weight of wood, the calorific value of absolutely dry wood being about 4,000 units.

Analyses.

Analyses of the peat mosses made from samples obtained at the undermentioned places in Canada have been found to yield the following results :—

From the St. Dominique bog, Eastern Townships of Quebec, (well dried).

Fixed Carbon	29·30 per cent.
Volatile matter	63·43 "
Ash	6·75 "

* A metric unit is the amount of heat required to raise one gramme of water from 0° to 1°C.

AT THE LENNON OR INDIAN ISLAND BOG.

In Prince Edward Island.

	Mean
Hygroscopic water	23·76 per cent.
Volatile combustible matter	41·19 "
Fixed Carbon	19·83 "
Ash	15·26 "

In Ontario.

At the Newington bog referred to above, Stormont Co., (calculated on 15 per cent water content).

Water in original sample	87·94 per cent.
Volatile combustible matter	56·74 "
Fixed Carbon	27·21 "
Ash	1·05 "

At the Brockville bog.—Upper stratum, 3 feet. (Calculated on 15 per cent water content).

Volatile combustible matter	55·08 per cent
Fixed Carbon	20·62 "
* Ash	9·32 "

The lighter and more spongy varieties of peat when aired are very inflammable, firing at a temperature of about 200° C. the denser pulpy kinds ignite less readily when in the natural state and often require a still higher temperature when prepared by pulping and compression, or partial carbonization. Most kinds burn with a red smoky flame developing a strong odour which, however, has its admirers. This arises from the destructive distillation of imperfectly carbonized organic matter. The ash like that of wood is light and powdery, except when much sand is present, when it is of a denser character.

PEAT AS A FUEL COMPARED WITH WOOD AND COAL.

The value of peat as a fuel naturally depends on its calorific effect and its cost of production. To ascertain its heat value, thorough tests were made a few years ago by Prof. Klasson, one of a committee appointed by the Swedish government to investigate the value of Value of peat as a fuel.

* The analyses of Ontario bogs are taken from a Bulletin on Peat Fuel by Mr. W. E. H. Carter, B. A. Sc. Ontario Bureau of Mines, 1903.

peat coal by the so called Angel and Ekeland methods. The following table has been computed showing the results of these tests.* The peat coal was pronounced to be of less value than what it was claimed to be, 16 per cent of the heat used in the carbonization process of the peat being lost, and the conclusion reached was that with coal at $4 per ton or more it would be too expensive to carbonize peat, as peat coal produced in the manner described in the methods referred to would cost about $7 per ton. On the other hand it was found that, for consumers near the bogs, uncarbonized peat was the cheapest fuel that could be had in Sweden.

Tests made in Sweden.

Composition.	Wood.	Peat.	Brown Coal.	English steam-coal
	Per cent.	Per cent.	Per cent.	Per cent.
Carbon	52·0	58·0	66·0	81·0
Hydrogen	6·2	5·7	4·6	5·2
Oxygen	41·7	35·0	28·0	1·0
Sulphur				1·0
Nitrogen	0·1	1·2	1·0	11·5
Calories, (a)	19	57	60	80
Moisture or hydroscopicity	20·	22·	25	7·6

(a) By calories is here understood the amount of heat required to raise 1 kilogram of water from 0° C. to 100° C.

CANADIAN PROCESSES FOR CONVERTING PEAT INTO FUEL, ETC.

Canadian process for making peat fuel.

Hodgess process.

1. One of the earliest attempts to manufacture peat fuel in Canada was in 1864 by Mr. James Hodges, an English engineer; and the bog in which he began operations was at Bulstrode, in Arthabaska county, Quebec. The process consisted in placing a machine with revolving disks upon a floating scow, a canal having been cut for this purpose. The scow or barge was to contain all the machinery necessary for the complete manufacture of the peat, which, when excavated was to be

*Jubilee number for 1896 of *Teknisk, Tidscrift*. Paper by Mr. Ernest E. Sjostedt, M.E. The Mineral Industry, vol. VII, pp. 191-198.

delivered into the barge. Here it passed through machinery which removed the roots and reduced it to a soft pulp. This pulp by means of a shoot or distributor was spread out to dry upon the levelled moss by the side of the canal in a sheet 9 inches thick, and 90 feet in width. Then after two or three days it become hard, and was cut across at intervals of six inches, and subsequently divided lengthwise in the same manner at intervals of eighteen inches. As soon as these blocks of peat 18x9x6 inches were sufficiently hard for handling they were taken up and stacked for further drying. As prepared in this manner the peat held 25 per cent of water. Experiments were made with peat thus prepared, for firing locomotives on the Grand Trunk railway, but it proved too fragile for handling or transport. Fifty tons of this air dried peat fuel could be produced in a day, costing 92 cents per ton.'

Aikman process.

2. On the suspension of operations by the Canadian Peat Fuel Company of Mr. Hodges, Mr. Aikman, who had been manager, introduced a process slightly different from that of Hodges. The peat after being pulped and freed from roots, was artificially compressed, and then dried in the air the drying requiring about six days. Mr. Aikman thus describes this process. The machinery is also carried on a scow which is made to float in the bog, the peat being extracted by a pair of large screw augers, working in front of the scow, which deposit it in a well where it is submitted to the action of steam from the exhaust of the engine. It is then carried by an elevator to the squeezer, where it is freed from about 33 per cent of water after which it is broken up by revolving teeth, passed through a centrifugal drier of a special construction and delivered into the press in the form of dry dust. By the action of heat and of the screw it is brought into a pasty condition, and the tar or resin naturally contained in the peat being softened under the pressure, it becomes partially carbonized and issues from the press in a continuous stick of peat fuel ready for use. The whole process is entirely automatic and only takes about 20 minutes from the time of excavation out of the bog till it is delivered from the press as a marketable fuel.'

The approximate cost of erecting a plant capable of producing 15 tons per day is $4,960, and the cost of operation is $16 per day.

Dickson process.

3. Another Canadian peat process of considerable interest, which was at one time thought to have overcome all difficulties, was that known as the Dickson method, invented by Mr. A. A. Dickson of Toronto. His process consists mainly in drying the peat on the surface of the ground or in sheds, without the application of artifical

[1] Report of Progress, Geol. Surv. Can. 1883 to, pp. 284 291.

heat, which he considered has an injurious effect upon the peat as fuel by dissipating more or less of the contained volatile matter. The peat dried by the sun or by the air was pulverized by passing it through a breaker, and then conveyed in this condition to a large hopper whence it descended to a press and was there stamped into cylindrical briquettes 2 by 2 inches. The compression was effected in a bottomless tube, under a weight of about 30 tons, the resistance being due to the friction and to the tube narrowing slightly in the lower part. The reduction in bulk is in the proportion of 6 to 1. The briquettes are hard and dense and have stood numerous tests showing their suitability for domestic use and for producing steam. The cost was about $1.50 per ton.

The Dickson plant was introduced at several of the Ontario peat works, namely, at Brockville, Perth, Stratford and Welland, but it is not at present in use.

Dobson process.

1. An important modification of the Dickson process has been devised and put into successful operation at Beaverton by Mr. Alex. Dobson of that place. The various stages in it may be briefly summarized as follows:

1. Ditching and clearing the surface of the bog.
2. Track laying of tramways.
3. Digging and spreading the peat on the cleared surface as taken from the bog.
4. Raking and gathering after exposure to sun and air.
5. Loading and taking to works.
6. Drying.
7. Pressing.
8. Delivery to store-room or loading to wagons for market.

The two first are simple matters and need not be further explained, but the third is performed at the Beaverton bog by a contrivance invented by Mr. Dobson called a "digger", driven by an electric apparatus. This machine travels up and down along the edge of a ditch 3 or 4 feet deep, the cutter being so devised that it may be raised or lowered according to the depth of peat intended to be cut. An endless chain travels down the outside and up the inside of the elevator box, and serves the double purpose of scraping off a thin portion of the peat from the plate, and of elevating it to a conveyor running across the front of the carriage. A rapidly revolving paddle wheel catches the stream of peat fragments and showers them over the surface of the bog

for a distance of 30 to 50 feet, forming a deposit of half inch or so in thickness, in excellent condition to be dried by wind and sun. It is not necessary that the first layer of peat should be dry before another is scattered upon it by the machine just described, as experience has shown that successive lay rs up to six inches in depth may be deposited without checking the drying process. The time required for this depends upon the weather. Wind is said to be more effective than the sun. Under favourable conditions of wind and sun, on a summer day, the moisture in a layer of peat 1 to 2 inches can be reduced from 85 per cent to 45 per cent in two or three hours. Drying the peat on the surface of the bog is not so effective however, as if it were placed upon a raised floor or platform. In a given time the latter method will take about 10 per cent more of the moisture out of the peat.

Scraping and raking the peat, in the Dobson process begin immediately after the peat is dry. This has been done by hand, and the peat taken to a tramway running from the works through the centre of the bog.

The loading of the peat thus collected into a tram-car, run by electric power, and taking it to the works is the next operation. It is generally put into a bin or stock-pile, but sometimes directly into the hopper of the "breaker" which chops or breaks it up into small particles to facilitate drying, after which it is delivered automatically to the drier.

The Dobson drier consists of a steel tube 30 feet in length and 3 feet in diameter. This is placed inside of a rectangular brick casing, and has a pitch of 14 inches in its entire length. The space between the brick-work and the cylinder admits of free circulation of heat and gases around the outside of the latter from end to end. The fire-box is built under the higher end of the cylinder which revolves 1½ times per minute. Angle irons 3 by 3 inches and 5 feet long are placed around the interior of the cylinder at equal distances apart, each raised by pins 3 inches from the surface. These are intended to still further break up the peat. The peat is put into the cylinder at the upper end, and passes through it by gravitation to the lower end in 20 or 30 minutes. It is then in a condition to be pressed into briquettes, and does not contain more than from 12 to 16 per cent moisture. The Dobson drier.

The dried pulverized peat as it passes from the drier empties into the buckets of an endless belt which dump it into a hopper between the drier and the briquetting press. From this it descends into the the dies where the peat in each is subjected to a pressure of about 50 tons weight. By another movement of the press the peat blocks or

briquettes are forced out below and caught up by the buckets of an endless belt and carried to a storehouse or bin. From 12 to 15 tons of pressed peat are thus prepared in a day. The cost per ton of this briquetted peat is stated to be about $1.80*.

The Dobson process has been in successful operation for four years during the summer months, and seems to have overcome the difficulties which so far have attended the preparation of peat fuel in Canada. It must be borne in mind, however, that the bog is a small dry one, and the conditions as regards the manufacture of fuel from the peat it contains are, to some extent, different from those of wet bogs.

Trent Valley Peat Works.

5. Among the unsuccessful attempts to prepare peat fuel in Canada that of the Trent Valley Peat Fuel Company may be briefly referred to. The company, it appears, had unlimited capital and intended to operate on a large scale. A very extensive plant was erected and work was carried on for two years or more, but owing to the difficulties met with in removing the water from the peat it was closed in 1902. The peat moss was submerged, and had, therefore, to be dredged. Hydraulic presses were built and used, capable of exerting, it is said, a pressure of 300 tons, or two tons to the square inch. The peat, after passing through a macerating machine, was loaded on trucks in layers between perforated trays overlaid with filter cloths and in this manner subjected to pressure. The results, so far as removing the water is concerned, may be thus stated: Average quantity of water contained in the peat as it entered the press, 77.71; on leaving the press, 63.48. This result was also too high in moisture to allow of drying afterwards by artificial heat, as air or sun drying generally reduces the contained moisture to 30 or 40 per cent. And moreover, four men and an engineer were required to operate the plant, so that the cost was too great for the quantity of peat turned out and the small amount of water extracted.

The Welland Peat Works.

6. The Welland peat bog, described on page 22, No. 101, is another of those in which a large amount of experimental work has been carried on and unfortunately with little or no practical results. It is now about 12 years since the first attempt was made to use the peat of this turbary for moss litter. The drying process has presented greater difficulties here than in most other bogs in the province, due chiefly to the fact that the bog is low, and consists to a large extent of dead peat in a wet condition. Years ago this was an undrained swamp. Some parts of the centre are still covered by growing moss; but most of it is a black mass of decaying vegetation full of roots of

* Bulletin No. 5, Ontario Bureau of Mines, prepared by W. E. Carter, B. Sc.

trees and shrubs, especially at the margin. The process of converting this peat into fuel was commenced a few years ago by a company called The Peat Industries, Limited, of Brantford. Mr. T. F. Simpson was put in charge. The artificial drying processes, especially that of the Beaverton peat works, were found ineffective owing to the denser and more saturated condition of the peat and the quantities of roots in it. Mr. Simpson, therefore, invented a drier of his own, which consisted of two parallel revolving cylinders, 30 feet long, placing one above the other, each somewhat similar to the Dobson drier, the space between them being occupied by a conveyor pan, forming, in reality, a third compartment. The peat was made first to pass through the lower cylinder, then through the intervening compartment, last through the upper cylinder, from which it was delivered to the breaker, instead of having been put into this first as in the Dobson process. The tests made of the Simpson drier, whether really complete or not, failed to reduce the moisture in the peat to less than 24 or 25 per cent, whereas, before it can be pressed into briquettes the moisture must be reduced to at least 15 per cent. This process did not, therefore, prove of value inasmuch as it was too slow in operation, as well as for the reason stated, taking between two and three hours for the peat to pass through the drier and di-integrator.

An improved form of the Simpson drier has recently been made, but whether or not it has proved successful has not been ascertained

7. Three years ago, The Quebec Combustible Company, Limited, of Fraserville, commenced the manufacture of peat fuel near Cacouna station, Intercolonial railway, where there is a very good bog. The process seemed to consist of pulping the peat and mixing it with crude petroleum and some other combustible materials, after which it was put into a moulding machine and formed into bricks, each brick weighing about two pounds and then dried. The capacity of the mill was 15 tons every ten hours. It was driven by a 20 horse-power engine, the boiler being heated with air-dried peat. Eight men were employed, including those who excavated the peat. The process was a mere experiment; but unfortunately in the autumn of 1901 the whole plant was destroyed by fire, and has not since been rebuilt.

European Processes

8. Two European processes are now about to be employed in the preparation of peat fuel in Ontario,—one at Nesington, Stormont county, (see No. 87 list of localities of peat bogs) and the other at Brockville (No. 88 of the same list). The first is operated by the Dominion

The "superheated air" process at Newington.

Peat Products Company, Limited, of Brantford, with head quarters in Ottawa, and the process is known as the "superheated air," or "economic" process. The plant consists of,—(1) a machine known as the German digger or cutter. A number of these are placed on the bog, each one operated by two men. Blocks of peat about a foot square are lifted by them from any depth down to 25 feet, thrown into a heap to drain off and then to be conveyed to the brick-making machine. (2) The conveyor is a trough erection with an endless chain having discs about two feet apart. Into this trough the peat is placed and the conveyer driven by a 25 horse-power engine to the power-house, where, (3) a brick machine made and largely used in Germany receives it from the end of the conveyor. The machine has screw knives which cut up the peat and press it forward to an exit or mould which shapes it into brick-form about twice the size of an ordinary building brick. These bricks run out on a board over rollers and are then placed upon strong iron trucks in tiers so that the air can get all around them. This machine will turn out 60,000 bricks per day of ten hours, and is run by the same engine as the conveyor, both taking about 14 to 16 horse-power. (4) The chambers are in groups of four, each built of brick, iron and steel, side by side with arched roofs, their dimensions being 70 x 8 x 7 feet. Into these chambers the truck loads of peat are run on rails until the whole of the chambers are filled. The furnace, or furnaces, are then put into operation, and hot air is driven into the chambers by a fan, run by a separate engine when making fuel, and by a patent blower when carbonizing or making coke. This is called the "economic process" as it consists in a mechanical and chemical combination, which enables carbonization to take place by the admixture of air and gases so as to avoid combustion. The degree of heat for fuel-making runs up to 250° and 300° F., and for carbonization 350 to 550 F., the latter taking double the time of the former. Fuel drying takes from 24 to 36 hours, and coke making, (not yet demonstrated), will take about 48 hours. The capacity of the eight chambers when the trucks are complete will be an output of 100 tons of fuel every 24 hours.

By this process the peat is not disintegrated or pulverized and then compressed, but is kept intact from the time it leaves the bog till it is put into the chambers. The bricks are reduced by drying to the size of an ordinary building brick, and quite hard. As a fuel it burns freely, in stoves, grates or furnaces, but requires close draughts. When mixed with anthracite it produces great heat. It is about twice the bulk of coal, but it is clean and gives off little odour. The

cost of production is about $1.25 per ton, if produced in large quantity ; and it can easily be sold at the factory for $3.

This "super-heating" process, as it is called, is turning out millions of tons of fuel annually in Europe. The plant introduced at Newington is the same as that of the European process, with some modifications that are said to adapt it to the working of the peat bogs of Canada.

Brockville Peat Works.

The second European process referred to is that now being introduced at Brockville, Ontario, and known as the Sahlstrom process, replacing the Dickson plant there at the large bog two miles north of that town, (see No. 88 for description of bog.) The Sahlstrom Fuel Syndicate installed their plant, in 1903, but owing to the lateness of the season when it was set up, postponed operations till this spring (1904). In this process the peat after being brought to the works is passed into a compressor, or squeezer as it is called, which deprives it of a large proportion of the water it contains. From this it goes into a machine which cuts or tears it into small pieces without injuring the fibre. Then it is conveyed into a specially constructed drier consisting of a number of horizontal cylinders heated by means of the waste gases drawn from the carbonizer . The peat is carried through these cylinders by screw conveyors, and during this process becomes still further broken up. The temperature in the drier is not allowed to exceed 150° C. In passing through the cylinders the remaining moisture together with wood spirit, acetic acid, etc. are distilled over and collected into condensers by the ordinary methods. On leaving the drier the peat passes into a revolving screen where the fibre is automatically removed from the crushed material. After this the peat passes into the carbonizer. Here it is partially or wholly carbonized as required, the semi-carbonized peat being more suitable for steam-raising on account of its having more flame when burning, while the fully carbonized fuel is better suited for smelting ore and for manufacturing purposes. The carbonizer is of somewhat similar construction to the drier, and is fed and wrought automatically. The inflammable gases produced in it supply all the fuel required for the entire process as well as power for driving all the machinery, and the operations being altogether automatic the costly element of labour in handling is reduced to that required for mere oversight of the operations.

The Sahlstrom process.

After leaving the carbonizer the peat passes into the cooler into which some of the distilled products, such as tar or gas are usually conducted, to be wholly or partially absorbed by the carbon. The carbon, on being cooled, passes into an ordinary briquette machine, or through a disintegrator, which latter machine converts it into a fine

powder. This has proved to be the most economical form in which coal fuels can be used as steam raisers.

By briquetting after, instead of before carbonization, it is said the Sahlstrom process not only leads to great economy of time, fuel and labour, but produces a far denser fuel, which is cleaner, suffers less loss and injury through handling and exposure to weather than any other form of peat fuel, and is even less bulky than coal, while equal to anthracite in calorific value. Unlike ordinary machine-made peat fuel, peat coal be stored in the open air, as it has very little tendency to absorb moisture.

The Sahlstrom process leads to great economy of time. From the raising of the peat from the bog until the finished fuel is ready for shipment occupies only about four hours.

Cost of prepared peat fuel by this process.

Powdered peat fuel has been used with marked success for a number of years at Jonkoping in Sweden. This kind of fuel can be manufactured at a cost of about $1.75 per ton. It is called semi-carbonized fuel, in the Sahlstrom process. Pressed peat briquettes can, however, be produced at a cost of $1.00 per ton. A third form of fuel can also be prepared, composed chiefly of pure carbon, with a calorific value equal to that of anthracite, while its bulk is rather less. This will cost about $2.50 per ton.

It is claimed for the Sahlstrom process that (1), it is an improvement on any hitherto employed, inasmuch as in the driers the peat is exposed at first to a low temperature only, which can be gradually increased until carbonization is effected; in this way the bye-products are given up separately and all practically saved. (2) These distilled products, namely, tar, ammonia, acetic acid, wood spirit, the inflammable gases, etc. etc., are collected in such a manner that they can be saved at a minimum of cost, and, (3) all the work is done automatically.

The Electric process.

7. In the February number of *Popular Mechanics* Mr. William H. Mason, United States Consul General, describes a process exhibited recently at Charlton, in Kent, England. It is known as an "electrical process" for converting ordinary peat into firm smokeless steam coal, and at a cost which promises to bring the product far within the price limit of steam fuel in Great Britain and continental Europe. The peat is cut and excavated by machinery, loaded into dumping cars which convey it from the bog to the plant, where it is packed into rotary iron cylinders of a peculiar construction. The cylinders being rotated at high velocity, the centrifugal pressure, aided by an interior

heating device, expels all but a small remnant of the water which the material originally contained. Electrodes connected by conductors with a dynamo, are then inserted in the cylinders in such a manner that the mass of centrifugally dried peat becomes the medium through which the circuit is completed between the electrodes. The resistance offered by the peat, like the filament of an incandescent lamp, generates heat which carbonizes the material, producing a mass of disintegrated black globules, which retain all the valuable elements of the original peat moss. This part of the process, which depends largely upon the conductivity of the peat, may be promoted by moistening the mass with certain cheap liquid chemicals the use of which is covered by the patent. From the cylinders the carbonized material passes to machines which knead it into a putty-like mass that is then pressed into briquettes or left to dry and harden in masses. These are broken into lumps, screened and graded like ordinary coal. Among the special advantages claimed for this method is the fact that the electrical current converts, but does not destroy, any of the valuable elements of the peat, whereas coking by fire heat expels a large percentage of these elements in the form of gases, which, being either wasted or burned as fuel beneath the retorts, are lost from the composition of the ultimate product. Briquettes produced by this method can be compactly stowed on shipboard or elsewhere; they are practically smokeless, leave no clinkers at all, and have the high thermal value of 9,000 British units. The cost of a plant capable of treating 100 tons of peat per day is stated to be $19,500. The actual cost of producing one ton of peat fuel by this process is stated to be $1.21, equal, for all steam generating purposes, to a ton of South Wales steam coal, which costs at the mouth of the mine $2.02. These are given as the economic results in a location where the electric current used by the process is generated by steam. In districts where within a working radius of peat bogs, generators can be driven by water power, the cost of production would be proportionately reduced.'

Countries in which the manufacture of peat into fuel has been a success.

8. In most of the countries of Europe in which peat occurs its manufacture into fuel has been made a success; as, for example, in Great Britain and Ireland, France, Norway and Sweden, Holland and Denmark, Germany and Russia. It seems to be in Holland that the peat fuel industry has reached the greatest development, though in Sweden and Germany it has also attained large proportions of late years. It is not only for fuel that peat is used but in the manufacture of textile fabrics also, such as mats, blankets, and certain kinds of wearing apparel, etc. In France and Russia it is made into cloth for bandages

and surgical purposes owing to its antiseptic properties, while as a fibre for paper making it is now receiving attention in England.

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